

## **ENVIRONMENTAL HEALTH ASPECT IN HEALTH EMERGENCY MANAGEMENT**

### **(A CASE STUDY : SINABUNG VULCANOUS ERUPTION)**

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### **ABSTRACT**

Indonesia is located between 3 earth's plates and there are 129 active volcanoes, that make Indonesia as one of a country with a very disaster hazard. In the last few years, the natural hazard of hydrometeorological such as floods, landslide and drought increase. Similarly few volcanoes in a few regions erupted. Mount Sinabung in Karo Regency burst in August 2010 and most recently on 15 September 2013, it launched a series of eruptions until now that cause a trauma to evacuees. Thousands of evacuees stay in temporary shelters that are not qualified from the health aspect such as there is no clean water, latrine, a lot of garbage, and vector control. The contract is faced at the unreadiness/limitation of the Health Agency in Karo Regency. The purpose of this descriptive study is to see how far the readiness of the Health Agency in Karo Regency in facing the disaster situation, and the efforts of health environment that is conducted to minimize the risk factor occurred infectious disease. The result shows the unreadiness of Health Agency in Karo Regency particularly the staff, logistic and health environment equipments that cause some cases of disease which potentially becoming an epidemic such as diarrhea, Acute Respiratory Infection, measles, dengue fever.

**KEYWORDS:** Environmental Health, Disaster Management, Infectious Diseases

### **INTRODUCTION**

Indonesia is known to the world as the region highly vulnerable because there are all kinds of disaster ever happened. Geographically, Indonesia is located in between 3 tectonics plate including the Eurasian plate, Australia plate and Pacific plate. Beside that, there are 129 active volcanoes that can erupt at anytime and also frequent social conflicts. Even in recent years hydrometeorological disasters such as flood and landslides shows the frequency and intensity increased.

The disasters can degrade the welfare and the quality of life. There are two impacts, first direct impact on the time of the disasters which cause loss of life, environmental damage, loss of property and psychology impact. Second : indirect impact that affect the socia-economic life of nation especially people who are living in the disaster areas.

The disaster in Indonesia in recent years shows the enhancement. From 2002-2012 increased nearly 350 times <sup>[1]</sup>. Within the last 29 years, there were 1.614 natural disasters. In 1988-2003 there were 647 natural disaster happened which killed at least 2.022 people. Earthquake and tsunami in Aceh killed nearly 250 thousands people, in 2005 there are 281

disasters which killed 2.642 people, in 2006 there are 343 disasters with the deaths of 10 thousands and in 2007 there are 342 disasters with the deaths of 888 people.

According to the cycle of disaster management, there are three-stage approaches such as: the approach of emergency phase, reconstruction phase and preparedness phase <sup>[2]</sup>. In the beginning of emergency response period is the most critical period including on panic periode 1-4 days. Usually the aid will come soon either the equipment, health logistic and medical personnel, rescue team. Usually it will soon come to the aid in the form of equipment, medical logistic, rescue teams, Red Cross, elements of the military/ police, national and international NGOs, including volunteers. The larger the scale of disaster and its impacts more parties come to the disaster area for giving aid. All of this requires the effective leadership so that evacuation, medical assistance, logistics, sanitation and so forth for the victims can run smoothly.

Sometimes there are a lot of NGOs or volunteers in the disaster area who don't have obvious ability which eventually becomes a burden. For example, there were more than 400 organizations and more than 5000 volunteers when the Tsunami Aceh, 2004 <sup>[3]</sup>. and there were 900 registered NGO's in the Haiti when the earthquake, 2010. In some other disaster location, such as in Mentawai (2010) and Middle Aceh (2013), they firmly declare that they don't need volunteers.

The disorganized assistance inform of manpower and equipment will pose a threat to the rescuer teams <sup>[4]</sup>. Historically, there are disorganized volunteers who are always willing to take part in medical assistance in every disaster event <sup>[5]</sup>. Often we lose time because of the misunderstanding and daily routine including operational standards. Therefore, the collaboration is very essential <sup>[6]</sup> <sup>[3]</sup>.

The time is very important in providing the aid to the victims of disaster to rescue from the severity or death. The research result after the crisis in Rwanda shows that the aid workers see the issue of management and organization become the main barrier factors. It's also required *team leader* who has high alertness towards the issues related to the conflict, can be individual or group from local or national level <sup>[7]</sup>.

Coordination in the implementation of the disaster became a main priority for an effective humanitarian relief operations <sup>[8]</sup> <sup>[4]</sup>. Disaster management requires a multi organizational approach with coordination and cooperation as the key to success <sup>[9]</sup> <sup>[10]</sup> <sup>[11]</sup> and multidisciplinary <sup>[1]</sup>. Some one should know the importance of addressing emergency rapidly and chain of command.

A simple lesson from Asian Tsunami, 2004 which requires multi-disciplinary infrastructure in supporting the patients affected and the border issues between countries <sup>[12]</sup> <sup>[4]</sup>. Besides, the problem of coordination and logistical support rapidly, effective and efficient become a main challenge. Based on the experience of Bali bomb, particularly coordination problem of assistance and information flow as experienced by health emergency management New Zealand 2002 <sup>[13]</sup> <sup>[14]</sup> <sup>[3]</sup>.

During the emergency response the most of activities are focused on evacuation and rescue the refugees from the next disaster impact threat. Environmental health aspects such as the provision of clean water, latrines, vector control, garbage disposal / waste and provision of shelter tent for refugees become high priority. Potential outbreaks of infectious diseases such as diarrhea, cholera, malaria, measles, dengue fever, respiratory infection, leptospirosis, can occur if the environmental health aspect of neglected. In disaster management, the outbreaks occurrence in the middle of refugees are called the 2nd disaster which the victims could be many more the disaster before. As was the case in Rwanda and Haiti in 2010, where an outbreak of cholera occurred in the whole country starting from the refugees aftermath of tremendous

earthquake<sup>[15]</sup>.

The occurrence of eruption of Mount Sinabung in Karo region on 15 September 2013 ago , until now still left many problems for residents who live around the foot of the mountain. In January , February, and March 2014 there were 9.934 households or 32.162 refugees scattered in 34 refugee camps . The refugee camps partially are located in public buildings such as halls, place of worship , and tents that most of them do not meet health requirements, because :

- Lack of clean water / drinking water supply
- Lack of latrines/Toilets
- Trash and sewerage
- Vector control
- Over crowded

The Regent / district head determine the Incident Commander conduct the function of command and coordination such as: District Military Command commander 0205 Karo Region. Health agency of Karo region was not prepared to deal with this disaster occurrence either from the aspects of infrastructure and facilities, human resources, logistics and medicine. Health agency of Karo region only rely on the assistance of the provincial and central governments. This condition is very concerned so health services toward refugees are not optimal and potentially causing the occurrence of various diseases.

The most worrisome is the outbreaks of measles, but could soon be isolated so it is not widespread. In fact the measles immunization is done only 35% of the targets set out.

Data from the Media Center of main camp in the period of November 3, 2013 until February 7, 2014, the number of people who visit health service was recorded 143.446 visits dominated by the six diseases, such as, gastritis: 25.607 visits, Acute Respiratory Infection: 88.986 visits, conjunctivitis: 3.834 visits, diarrhea: 5.315 visits, hypertension : 4.409 visits, anxiety : 1.414 visits, and others 13.785 visits. The most worrying is the outbreak of measles, but could soon be localized so it does not spread. The fact of measles immunization only conducted 35 % of the target set .

## RESEARCH PROBLEM

- How far is the readiness of Health Agency of Karo regency in facing disaster situation and evacuation on the eruption of Mount Sinabung
- What is the effort of Environmental Health Department in facing the possibility of changes in several diseases among refugees.

## Research Objective

- To see how far the readiness Health Agency of Karo regency in facing disaster situations and evacuation on the eruption of Mount Sinabung.
- To see an overview of environmental health efforts in minimizing risk factor for the incidence of infectious disease.

## Theoretical Study

Health response in the response phase can be described schematically as follows :

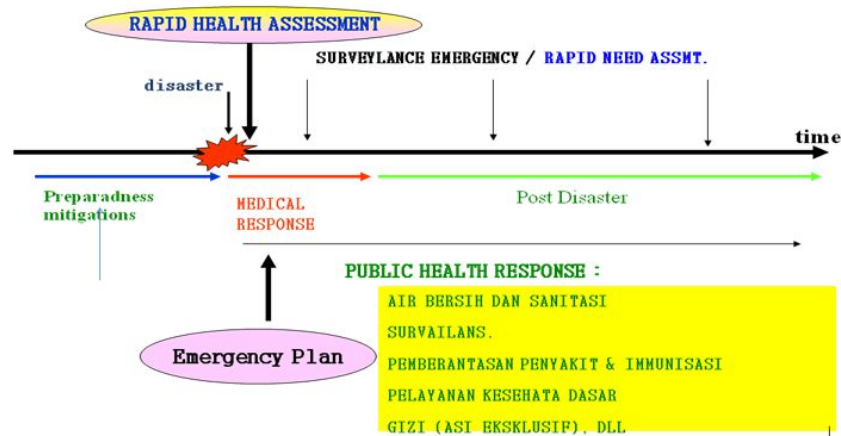


Figure 1

## Key Environmental Health Issues in Disaster

- Drinking water
- Food safety
- Sewage
- Waste and asbestos
- Communicable diseases
- Vector issues
- Animal management
- Shelter
- Mass gatherings (e.g. Evacuation centres)

(Ryan,2013)

## Water/Sanitation – Key Elements

- 15 liters per person per day for drinking, cooking and personal hygiene
- Each household has least two 10-20L water collecting containers
- < 500 meters from household to the nearest water point
- Safe water 24/7
- < 15 minutes wait at water point
- <3 minutes to fill a 20-litre container

- Water sources and systems are available regularly
- Each person, per month is entitled to 250g bathing soap, 200g laundry soap and one hairbrush

#### **Shelter- Key Elements**

- Covered area available per person averages 3,5 - 4,5 square meters
- Site is a safe distance from external threats
- Accessible by supply trucks
- Adequate water is available > 3 M above anticipated water table in rainy season
- Topography is suitable for drainage and soil is suitable for digging
- Adequate firebreaks of at least 2 meters between dwellings
- 6 m between clusters of dwellings
- 15 m between blocks of clusters

#### **SOLID WASTE AND DEBRIS**

##### **Priority Activities**

- Identify locations where solid waste and debris have been generated
- Remove solid waste and debris from key roads for emergency response vehicles and personnel
- Eliminate immediate threats to life and property
- Restore essential services
- Facilitate damage assessments, especially for critical facilities

##### **Wastewater**

- **Wastewater Pathogens**
  - Bacteria – E.coli, Salmonella, Typhoid fever and cholera
  - Viruses – Hepatitis A
  - Fungi – Aspergillus
  - Parasites – Roundworms, Cryptosporidium, Giardia
- **Disease transmission**
  - Spills are a point source for disease transmission
  - Pathogens can be transported far away from the point source
  - Transported by flies, roaches, people and animals
  - Pathogens introduced into living and food service areas

- Spills may not have recognizable odor or appearance

#### Vector Control

- **Mosquitoes**
  - *Anopheles sp* : Malaria
  - *Aedes sp* : DHF
- **Rodent**
  - *Leptospirosis*
  - *Plague*
- **Others**
  - *Displaced Animal: Dog, cat, etc*
  - *Snake*

#### Food Safety

- **Reasons for Concern**
  - *Disrupted Utilities*
  - *Contaminated food*
  - *Dependence on emergency supplies*
  - *Donated food and food sources*
  - *Food salvaging*
  - *Affected workforce*
  - *Varied responder readiness*
  - *Increase risk of foodborne illness (The Sphere Project,2011)*

### RESEARCH METHODOLOGY

This study is a descriptive with cross sectional study design. Data collection is conducted by direct observation to the evacuation camps condition and the data from Media Center main camp and Health Agency of Karo Regency which took place on May-June 2014.

### RESULTS AND DISCUSSIONS

From the results of field observations showed that readiness Karo District Health Office in facing the disasters and pengungsian was very poor in terms of infrastructure, human resources, logistics and medicines, especially from the aspect of environmental health. When the eruption occurred on 15 September 2013 where there was panic and a large number of refugees, Health Agency of Karo Regency absolutely didn't have health environment logistics such as masks, insecticides, water purification and etc. The condition of refugees camp didn't meet the qualification in terms of health such as: lack of

clean water and not adequate of drinking water, latrines, landfills, sewerage and conditions of the room was too crowded cause the refugees were potentially susceptible to some infectious diseases such as diarrhea, respiratory infections, malaria, dengue fever, and measles.

There is a gap of command and coordination between the incident commander with the leadership of Health Agency in the district. Complaints about the condition of refugee at each regular meeting at the main camp as problems of water, sanitation, insect infestation and health complaints were not up to the health agency whereas it required immediate management . The number of patients with multiple diseases issued by the District Health Agency was less than the data released by the main media center post .

There was measles case, dengue fever case, the case of diarrhea high, and air respiratory infection is potentially causing outbreak which in turn may result *the second disaster*, as was the case in di Rwanda and Haiti in 2010. The adequate outbreaks of the environmental health aspects of disaster and refugees is a key element in preventing outbreaks of infectious diseases.

## CONCLUSIONS

- The Health Agency of Karo Regency is not ready to face the disaster situation in evacuation, both in terms of staff and the logistics of health environment.
- The Health Agency of Karo Regency only rely on the logistics, equipments and health environment staff from province and the central government.
- There is a discrepancy of communication, command and coordination with the Incident Commander, so that some health problems in evacuation places are not quickly addressed, whereas the collaboration between sectors are very needed. For example the hygiene problem should collaborate with the Sanitary Agency, the provision of clean water and the latrine facilities should collaborate with Public Work Agency.
- There are the cases of infectious disease that potentially becoming an epidemics such as diarrhea, Acute Respiratory Infection, measles, dengue fever.

## SUGGESTION

- The District Health Agency should have a buffer stock of environmental health logistics such as, masks, bags of trash, sanitation kits, water purification, disinfectants, insecticides, and fogging machines.
- Increase outreach to the society of good hygiene practices and healthy, at the start of the stage of preparedness
- Increase the knowledge and skills of health workers about the health aspects of the environment in disaster situations and refugee

## Supplement

Name of Shelter	Number of refugees	Watsan condition	Cases of diseases
UKA I	994 over crowded	Lack of water, toilet, sewage system	Accute respiratory infection,gastritis, diarrhea.
UKA II	1227 over crowded	Lack of water, toilet, sewage system vector/insect	Accute respiratory infection,gastritis, diarrhea.
Ora et Labora	398 over crowded	Lack of water, toilet, sewage system vector/insect	Accute respiratory infection,gastritis, diarrhea. 2 cases varicella (outberak)
Lap.Futsal	305 over crowded	Lack of water, toilet, sewage system	Accute respiratory infection,gastritis, diarrhea. 1 cases varicella
Islamic Centre	354 over crowded	Lack of water, toilet, sewage system	Accute respiratory infection,gastritis, diarrhea. 5 cases varicella (outbreak)
Tiga Binanga Losd	2438 over crowded	Lack of water, toilet, sewage system vector/insect	Accute respiratory infection,gastritis, diarrhea. conjungtivitis
Jambur Batu Karang	411 over crowded	Lack of water, toilet, sewage system vector/insect	Accute respiratory infection,gastritis, diarrhea. conjungtivitis
GBKP Katepul	239	Lack of water, toilet, sewage system vector/insect	DHF suspect
Paroki II	248	Lack of sewage system	1 case measles (outbreak)
KNPI	669	Lack of water, toilet, sewage system, garbage. vector/insect	Accute respiratory infection,gastritis, diarrhea. conjungtivitis 30 persons food intoxication

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